

PUGET SOUND nearshore PROJECT



A partnership between the citizens and governments of the State of Washington and the U.S. Army Corps of Engineers and other federal agencies.

Overview of Puget Sound Nearshore Project

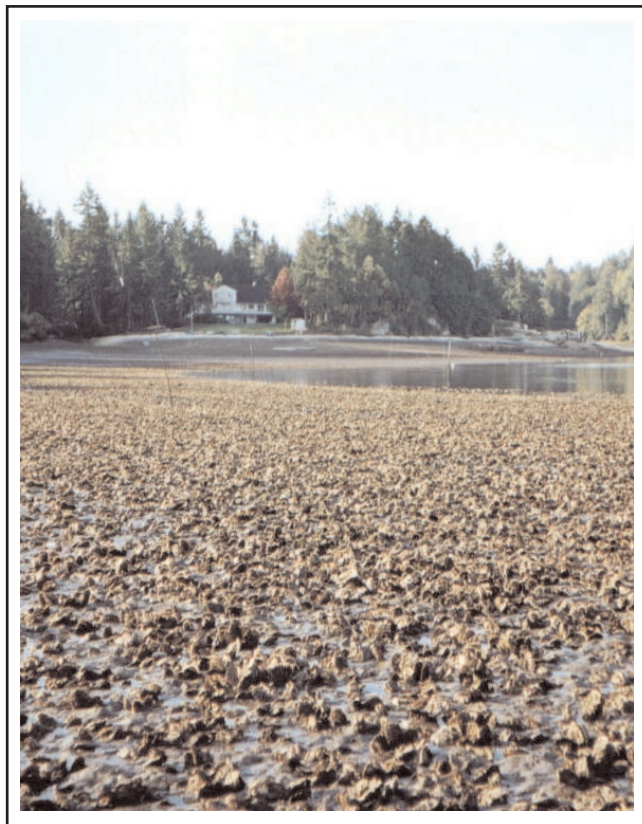
The Puget Sound Nearshore project is a cooperative effort among government organizations, tribes, industries, and environmental organizations to preserve and restore the health of the Sound's nearshore that runs from the bluffs on the land to approximately 30 feet deep into the waters of the Sound.

A General Investigation Reconnaissance Study conducted by the U.S. Army Corps of Engineers in 2000 identified a direct link between properly functioning (healthy) nearshore habitat and the physical condition of the shoreline. The study identified four areas that need restoration and improvement:

- Restoring shoreline processes to a more natural state,
- Providing beaches with essential sand and gravel materials,
- Removing, moving, and modifying artificial structures (bulkheads, rip rap, etc.), and
- Using alternative measures to protect shorelines from erosion.

Creation of the Puget Sound Nearshore Project

In 2001, diverse organizations agreed to a collaborative approach to ecosystem restoration and protection and committed support and resources to the Puget Sound Nearshore Ecosystem Restoration Project.



Timeline	1999	2001	2005	2008	Duration of Project
Project Phase/Stage	Reconnaissance Study	General Investigation Assessment Stage I: <ul style="list-style-type: none"> Adopt technical framework and conceptual model Access existing information Stage II: <ul style="list-style-type: none"> Identify needed information Conduct field studies Develop project criteria Stage III: <ul style="list-style-type: none"> Identify restoration and protection projects Begin developing and issuing permits for programmatic priorities 	Engineering and Design	Construction – General	Maintenance (Monitoring)

Requirements for a Successful Project

In order to successfully restore and preserve the nearshore, a comprehensive and coordinated approach that is proportional to the magnitude of the tasks is needed now.

The Puget Sound Nearshore Project is a collaborative partnership among the Washington State Department of Fish and Wildlife, U.S. Army Corps of Engineers, tribes, other state and federal agencies, environmental organizations, local governments, and industries.

The partnership is committed to solving nearshore problems together, and it knows that the individual organizations have been unable to remedy the deterioration alone.

The nearshore project team has rapidly gained support and acknowledgement from industry and environmental groups who recognize the importance of the team's efforts and the promise of success.

In 1999 Congress authorized the U.S. Army Corps of Engineers to do a general investigation of the nearshore with funds appropriated for the study in the Water Resources Development Act of 2000.

We need continued support to restore the Puget Sound Nearshore.



Preserving and Restoring the Environmental Puget Sound Nearshore

The U.S. Army Corps of Engineers and the Washington State Department of Fish and Wildlife have entered into a 50/50 cost share agreement, and with the cooperation of a multitude of agencies and organizations have initiated a general investigation study. This investigation has allowed scientists and engineers to begin to assess and identify ecosystem restoration and protection opportunities while developing criteria to set priorities and develop projects in the Puget Sound nearshore environment.

Concurrently, the Puget Sound and Adjacent Waters Project that Congress authorized in the 2000 Water Resource Development Act provides a means to begin funding construction of critical habitat restoration and protection projects.

Nearshore 2002 Requests

Request to the U.S. Army Corps of Engineers to:

- Provide adequate funding to the Puget Sound Nearshore Project, including an additional \$800,000 in federal fiscal year 2002 to implement stage one of the Project Management Plan, and
- Support the Puget Sound Nearshore Project as a major habitat restoration project of national significance.

Petition to the President and United States Congress to:

- Provide \$1.2 million in fiscal year 2003 to continue the feasibility phase of the Puget Sound Nearshore Ecosystem Restoration Project, and
- Provide \$2 Million in fiscal year 2003 to begin construction of nearshore habitat projects under the Puget Sound and Adjacent Waters authorization.

Project Managers:

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Bernard.L.Hargrave.Jr@nws02.usace.army.mil

Tim Smith,

Washington State Department
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What is the Puget Sound Nearshore?

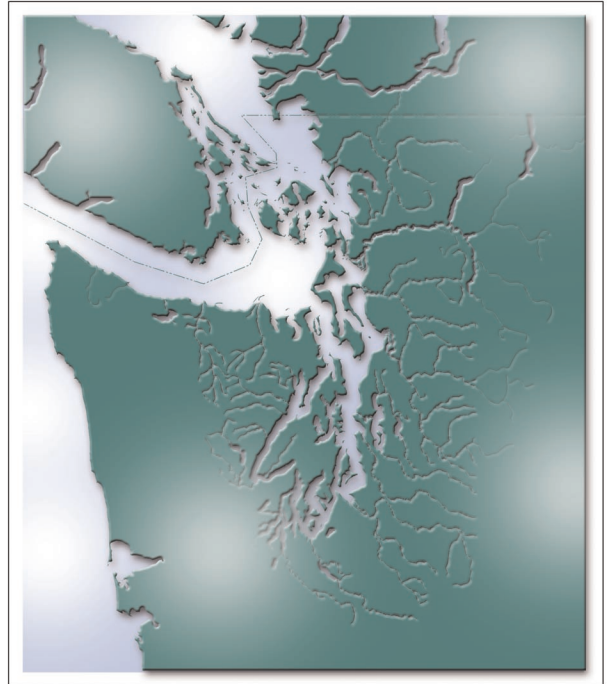
The Puget Sound Nearshore extends from the bluffs and the shoreline to approximately 30 feet deep into the waters of the sound. The nearshore boasts an essential, diverse, and abundant network of plants and animals.

Changes to the nearshore such as artificial structures (tide gates and bulkheads) and pollution from various sources including failing septic systems and agricultural and industrial activities can cause significant harm to the complex, fragile system.

Who needs the Puget Sound Nearshore?

For centuries, people have been drawn to the nearshore for economic and recreational purposes. Today, within the Northwest our lifestyles and economy rely on the Puget Sound Nearshore.

Shellfish and salmon industries, ports, and recreational activities all depend on the tidelands and shoreline.



What is the problem with the nearshore?

Life within the nearshore is in jeopardy. That jeopardy can cause further harm to people who live near or depend on the nearshore, as well as to the greater Puget Sound environment. Nine of the 10 species listed as endangered or threatened within the Puget Sound region inhabit the nearshore.

Federally Listed Species	Habitat Used		
	Uplands	Nearshore	Offshore
Bald Eagle	●	●	
Marbled Murrelet	●	●	●
Puget Sound Bull Trout	●	●	●
Aleutian Canada Goose	●	●	
Humpback Whale		●	●
Stellers Sea Lion		●	●
Hood Canal Summer Chum Salmon		●	●
Puget Sound Chinook Salmon		●	●
Spotted Owl	●		
Howelia Aquatilis	●	●	

People have changed the nearshore much faster than plants and animals could adapt. Since 1970, 1.7 million people have been added to the population of Puget Sound, which now is home to 3.9 million people. By 2020, nearly 5 million people are expected to live in the Puget Sound region. If the nearshore is to survive, we must find ways to reverse the rapid deterioration of the ecosystem and dependent economy.

Development has modified shorelines and reduced the necessary movement of sediment, which is critical to successful spawning for forage fish and productive shellfish.

For example, the shoreline of Seahurst Park in Burien has been degraded by a rock intertidal structure built to assist public access. The result has been wide-scale changes in the beach shape, makeup, and use by aquatic species.

Alterations to the Sound's productivity have travelled throughout the food chain. Pollution in parts of Puget Sound have caused lesions and tumors in flatfish that eagles, seals, birds, and porpoises eat. Reductions in forage fish populations from sea grass impacts due to human development and shoreline modifications have direct effects on salmon survival and possibly to the orca that feed almost entirely on herring, baitfish, and salmon.

What has been done to fix the problem?

Many organizations have attempted to preserve and restore parts of the nearshore through a variety of methods. Within the past 30 years, small-scale restoration projects have resulted in some improvements; yet, the ecosystem continues to degrade at a rate faster than restoration has occurred. Local efforts have been made to protect critical habitat; however, the efforts have addressed a very small portion of the entire problem.

What is needed?

A comprehensive and coordinated approach to the restoration and preservation of the Puget Sound Nearshore that is proportional to the magnitude of the tasks is needed now.

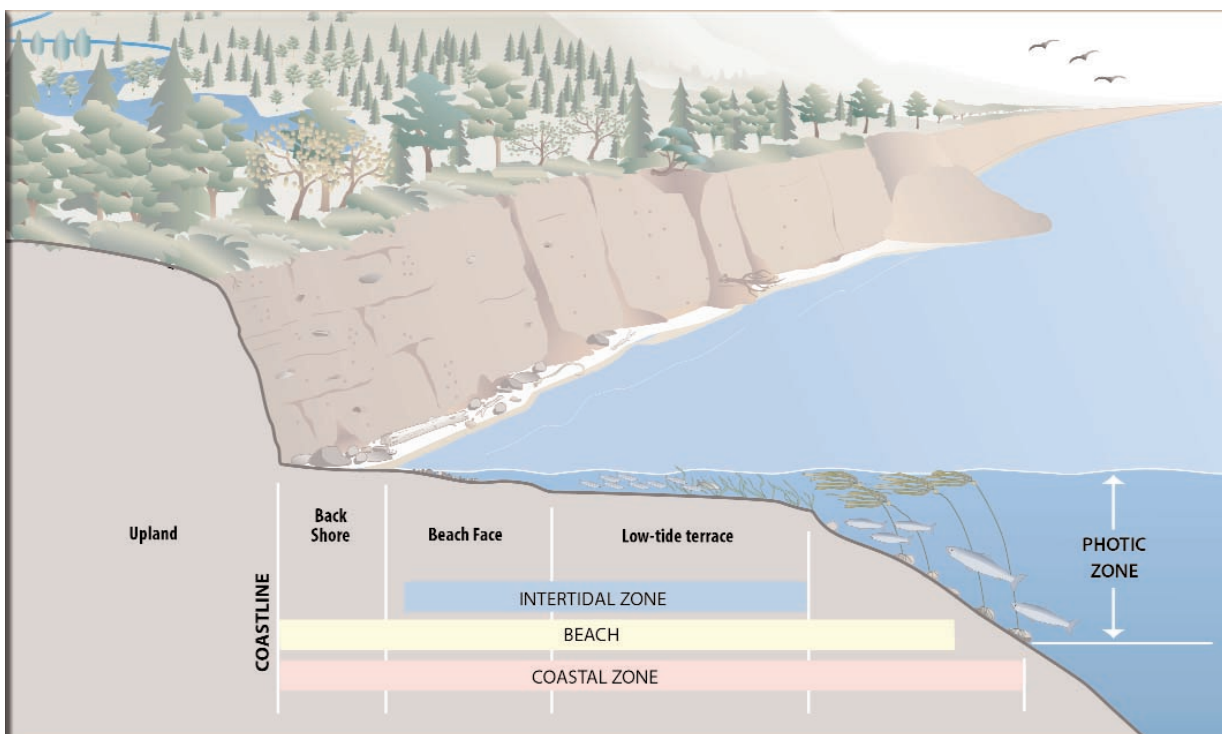
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Nearshore Section Illustrating Typical Zonation

State of the Nearshore Report

Map produced by:
GIS and Visual
Communications Unit,
WLR
File name: 0012 SON
Near Section.eps2 LP

A wide-angle photograph of a beach. The foreground is filled with grey pebbles and numerous pieces of driftwood, including large logs and branches. The beach extends to a calm body of water. In the background, a steep, forested cliff rises from the shoreline. The sky is overcast and grey.

What is the Puget Sound Nearshore?

A photograph showing a wide, rocky beach in the foreground, covered with numerous dark, wet rocks. In the middle ground, there is a calm body of water reflecting the sky. The background is a dense forest of tall evergreen trees, with a small white building visible on the left side of the shoreline.

- Puget Sound is central to Washington State's economic prosperity and it is of national significance. It provides:**

- Puget Sound has experienced significant physical changes to its nearshore habitat as well as population declines in some of its best-known and important plant and animal species:**

- A General Investigation Reconnaissance Study conducted by the U.S. Army Corps of Engineers in 2000 identified a direct link between properly functioning (healthy) nearshore habitat and the physical condition of the shoreline. The study identified four areas that need restoration and improvement:

- Restoring shoreline processes to a more natural state;
- Providing beaches with essential sand and gravel materials;
- Removing, moving, and modifying artificial structures (bulkheads, rip rap, etc.); and
- Using alternative measures to protect shorelines from erosion.

Timeline	1999	2001	2001	2005**	2008**	Duration of Project
Project Phase/ Stage	Reconnaissance Study	Washington Dept. of Fish and Wildlife and the U.S. Army Corps of Engineers enter into a Federal/ Local Cost-Share Agreement	General Investigation/ Assessment*	Engineering and Design	Construction – General	Maintenance (Monitoring)
<p>* Some construction on "early-action" projects to begin under separately funded construction authorities</p> <p>** Estimated timeline</p>						

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Concurrently, the Puget Sound and Adjacent Waters Project that Congress authorized in the 2000 Water Resource Development Act provides a means to begin funding construction of critical habitat restoration and protection projects.

Right now, the 2002 Washington State Legislature is considering a petition for the Puget Sound nearshore. It is anticipated that the petition will be presented to the President and United States Congress and request the following measures:

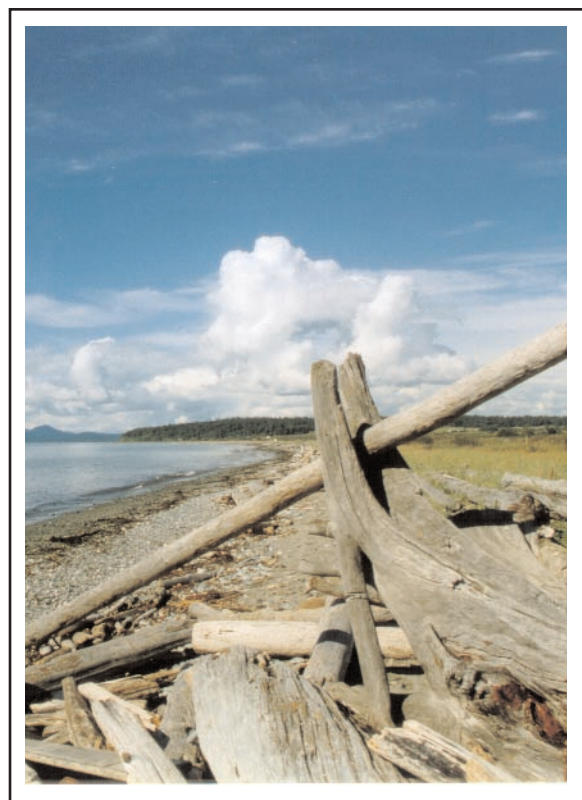
- Support funding for programs and activities in federal, state, tribal and local agencies that conduct monitoring, research, data management, and assessment of the Puget Sound nearshore environment, and
- Support funding for construction of priority projects in the nearshore environment

Request to the U.S. Army Corps of Engineers to:

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Why is the Puget Sound Nearshore significant?

The Puget Sound Nearshore is key to the life in the Puget Sound estuary. The estuary is a semi-enclosed, glacial fjord (long, narrow and deep inlet) where salt water from the ocean mixes with fresh water that falls as precipitation or drains from the surrounding land.

More than 10,000 streams and rivers drain into Puget Sound. Approximately 2,500 miles of shoreline surround Puget Sound, which is a mosaic of beaches, bluffs, deltas, mudflats and wetlands.

Much of the promise and potential of this region is based on natural resources and the industries, tourism and recreation these resources support. While much of the Sound is healthy, rapid growth and development in the region are stressing the system. A steady loss of habitat, alarming declines in some fish and wildlife populations, and closures of shellfish beds are signs that the very best of Puget Sound is threatened.

The Puget Sound Nearshore extends from the bluffs and the shoreline to approximately 30 feet deep into the waters of the Sound. The nearshore boasts an essential, diverse, and abundant network of plants and animals.

The Puget Sound's Nearshore environment depends on slivers of sunlight penetrating the waters to provide life to eelgrass meadows where migrating salmon feed and hide from predators. When the nearshore is healthy its flat, sandy areas are home to flounders, shrimp and worms, as well as kelp and other algae that provide food and hiding places for millions of other creatures that are integral to the Sound's food web.

Puget Sound is one of the nation's largest and most complex inland seas and it is an extremely unique ecosystem. Puget Sound boasts:

- Diverse flora and fauna ranging from kelp forests to orca whales;
- Wide tidal range that has created some of the largest, most productive estuarine environments in the world; and
- 2,500 miles of shoreline.

Puget Sound plays an integral role in the region's successful and growing economy; it is central to Washington State's economic prosperity and national significance. It provides:

- Prosperous salmon and shellfish industries;
- Access to numerous ports and refineries serving Northwestern states;
- Quality of life that attracts and inspires citizens who revolutionize high technology ranging from aerospace to the Internet and biotech; and
- Unique natural features for shipping and military facilities.

Puget Sound has experienced significant physical changes to its nearshore habitat as well as population declines in some of its best-known, important plant and animal species:

- Human development has modified one-third of the Puget Sound shoreline;
- Inter-tidal salt marsh habitat has declined 75 percent since the 1800s;
- Nine of the 10 species listed as endangered or threatened within the Puget Sound region inhabit the nearshore;
- Three Puget Sound salmon species have been listed as in danger of becoming extinct according to the federal Endangered Species Act; and
- Resident Orca whale populations have declined significantly from 97 in 1996 to 78 in 2001.

Changes to the nearshore such as artificial structures (tide gates and bulkheads) and pollution from various sources including failing septic systems and agricultural and industrial activities can cause significant harm to the complex, fragile system.

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For centuries, people have been drawn to the nearshore for economic and recreational purposes. Today, within the Northwest our lifestyles and economy rely on the Puget Sound Nearshore.

Shellfish and salmon industries, ports, and recreational activities all depend on the tidelands and shoreline.

What is the problem with the nearshore?

Life within the nearshore is in jeopardy. That jeopardy can result in further contaminated shellfish and reduced habitat

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Hood Canal Summer Chum Salmon	●	●	●
Puget Sound Chinook Salmon	●	●	●
Spotted Owl	●	●	●
Howellia Aquatilis	●	●	●

on and near Puget Sound. Nine of the 10 species listed as endangered or threatened within the Puget Sound region inhabit the nearshore.

People have changed the nearshore much faster than plants and animals could adapt. Since 1970, 1.7 million people have been added to the population of Puget Sound, which now is

not only for the aquatic environment, but also for people whose livelihoods depend on shellfish and fish, as well as others who enjoy boating and recreating

home to 3.9 million people. By 2020, nearly 5 million people are expected to live in the Puget Sound region. If the nearshore is to survive, we must find ways to reverse the rapid deterioration of the ecosystem and dependent economy.

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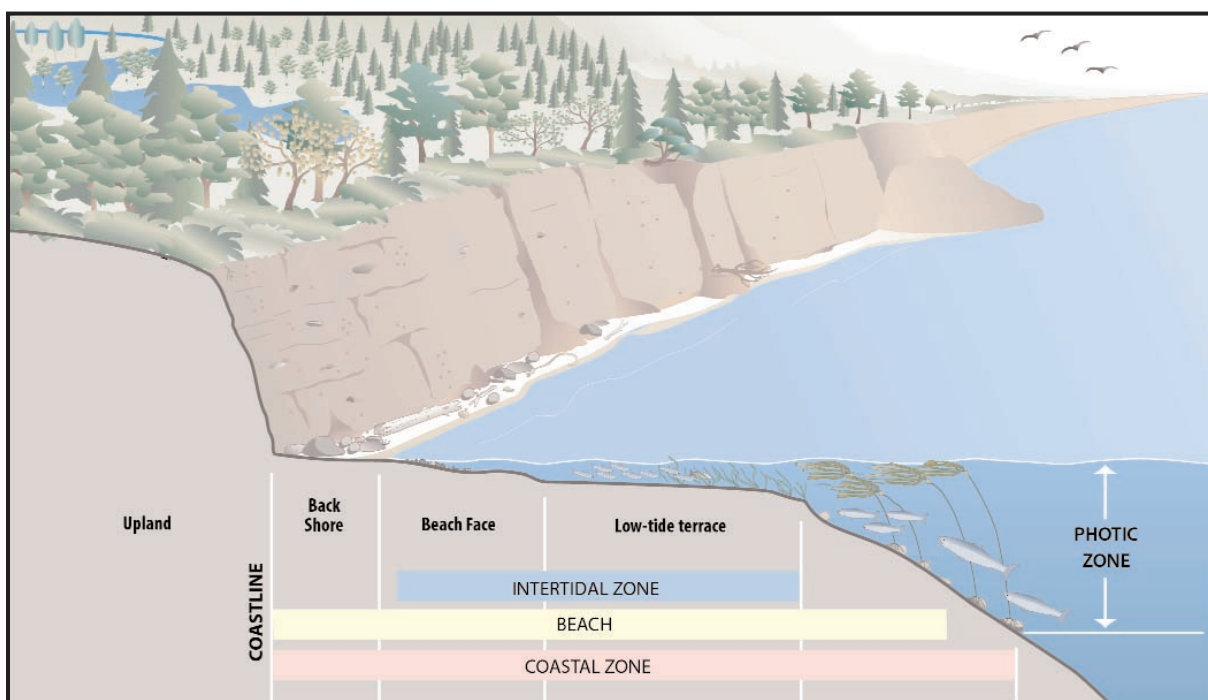
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What has been done to help the nearshore?

Many organizations have attempted to preserve and restore parts of the nearshore through a variety of methods. Within the past 30 years, small-scale restoration projects have resulted in some improvements; yet, the ecosystem continues to degrade at a rate faster than restoration has occurred. Local efforts have been made to protect critical habitat; however, the efforts have addressed a very small portion of the entire problem.

The Puget Sound Nearshore Project provides the necessary comprehensive and coordinated approach to establish priorities to improve and protect the health of the nearshore and the aquatic and marine life that depend on it.

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Nearshore Section Illustrating Typical Zonation

State of the Nearshore Report

Courtesy of King County

Map produced by:
GIS and Visual
Communications Unit,
WLR
File name: 0012 SON
Near Section.eps2 LP

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Partners Cash and In-Kind Contributions

<u>ORGANIZATION</u>	<u>APPROXIMATE VALUE</u>
City of Seattle	\$140,000
Friends of the San Juans	100,000
Interagency Committee on Outdoor Recreation	20,000
Island County	15,000
King County Conservation District	50,000
King County	50,000
Kitsap County	25,000
Northwest Indian Fisheries Commission	20,000
Northwest Straits Commission	30,000
People for Puget Sound	20,000
Pierce County	50,000
Point No Point Treaty Council	150,000
Puget Sound Water Quality Action Team	50,000
Salmon Recovery Funding Board	375,000
Skagit County	20,000
Taylor United Shellfish Company	15,000
University of Washington	45,000
Washington Department of Ecology	15,000
Washington Department of Fish and Wildlife	80,000
Washington Department of Natural Resources	400,000
Washington Public Ports Association	15,000
Washington Sea Grant	15,000
Washington State Conservation Commission	150,000

In most cases, amounts are estimates and have been determined to be eligible as in-kind match.

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Executive Committee

Co-Chairs: Colonel Ralph Graves, Regional Director, U.S. Army Corp of Engineers
Dr. Jeff Koenings, Director, Washington State Department of Fish and Wildlife

Ken Berg, Manager,

U.S. Fish & Wildlife Services

Tom Fitzsimmons, Director

Washington State Department of Ecology

Kathy Fletcher, Executive Director

People for Puget Sound

Mona King, Branch Chief

U.S. Army Corp of Engineers

Nancy McKay, Chair

Puget Sound Water Quality Action Team

William Ruckelshaus, Chairman

Salmon Recovery Funding Board

Ron Sims, Executive

King County

Michael Schiewe, Division Director

National Marine Fisheries Service

Bruce Sexauer, General Investigation Coordinator

U.S. Army Corp of Engineers

Francea McNair, Aquatics Steward

Washington State Department of Natural Resources

Terry Williams, Commissioner

Northwest Indian Fisheries Commission

Steering Committee

Co-Chairs: Bernie Hargrave, Project Manager, U.S. Army Corps of Engineers
Tim Smith, Project Manager, Washington State Department of Fish and Wildlife

Andrea Copping,

Northwest Straits Commission

Bill Dewey,

Taylor Shellfish Company

Duane Fagergren,

Puget Sound Water Quality Action Team

Jim Fox,

Salmon Recovery Funding Board

Eric Johnson,

Washington Public Ports Association

Janet Kearsley,

Island County

Jacques White,

People for Puget Sound

Lynn Childers,

U.S. Fish and Wildlife Service

Terry Wright,

Northwest Indian Fisheries Commission

Debbie Hyde,

Pierce County

Ed Casillas,

National Marine Fisheries Service

Ad hoc members:

Fred Goetz, Federal Science Lead

U.S. Army Corps of Engineers

Tom Mumford, Local Sponsor Science Lead

Washington State Department of Natural Resources

Jeff Dillon

U.S. Army Corps of Engineers

Bernie Hargrave

U.S. Army Corps of Engineers

Science Team Members

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Disciplines: Federal Corps Lead
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Charles A. Simenstad

Disciplines: Intertidal Ecology & Habitats
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Tom Mumford

Disciplines: Non-Federal Sponsor Lead
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Kurt Fresh

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Miles Logsdon

Disciplines: Spatial Modeling & Data Management
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School of Oceanography

Megan Dethier

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Jan Newton

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Curtis Tanner

Disciplines: Restoration
U.S. Fish and Wildlife Service

Doug Myers

Disciplines: Member at Large
Puget Sound Water Quality Action Team

Guy Gelfenbaum

Disciplines: Member at Large
U.S. Geological Survey

Coastal Habitats in Puget Sound

Science in Support of Nearshore Ecosystem Restoration

Concern for the health of Puget Sound nearshore habitats has escalated with the recent Endangered Species Act listing of salmon. Nearshore habitats provide, food, shelter, migratory corridors and even spawning areas for salmon, crab, forage fishes, and other important species. To develop effective salmon and nearshore ecosystem recovery programs, local and state governments seek a better understanding of what promotes and sustains a healthy, functioning shoreline. The US Geological Survey can provide objective science, technology development, and information transfer in support of adaptive management strategies for the conservation, protection, and restoration of the region's unique coastal resources.



Over 2000 miles of geologically diverse and ecologically productive shoreline encircle Puget Sound, which is dominated by eroding bluffs, unstable glacial sediment, large river deltas, low-lying beaches, and small streams. Natural events, such as landslides, flooding, and earthquakes, can play an important role in creating coastal habitat. Today, these same natural events pose a significant risk as population pressures increase in the region.

These pressures have resulted in human-induced changes along the coast that are widespread and include alterations of nearshore processes such as changes in hydrology, armoring of eroding bluffs, dredging, sediment disposal, and intertidal fills.

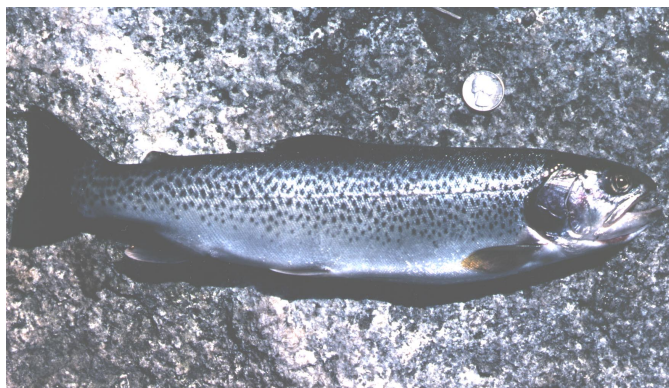
Managers question whether these modifications are responsible for:

- Declining populations of fish and wildlife
- Loss and degradation of seagrass and other coastal habitat
- Changes in water quality and availability

Biological activity is concentrated in the shallow nearshore waters and coastal streams of Puget Sound.

The viability of these nearshore habitats is directly linked to coastal geologic and hydrologic processes.

Understanding the natural processes and human-induced changes with respect to ecological function is critical to managing both the hazards and the valuable environmental resources found along the coast of Puget Sound.



Coastal cutthroat populations in Puget Sound have declined. To restore populations managers require basic information on the human influences on these species and their habitats. Unfortunately, less is known about this anadromous salmonid than any other salmon species in the Pacific Northwest. Biologists use the ear bone or otolith (right) for aging fish by reading the rings. Otolith growth patterns can also be used to determine how long juvenile salmon spend in fresh water versus estuarine habitats.



Unfortunately, knowledge regarding how biological and geological processes affect ecosystem health in the coastal zone of Puget Sound is largely nonexistent.

To fill this knowledge gap, the USGS will enhance science activity in the region. The science will be coordinated with partners at the University of Washington, the Army Corps of Engineers and with local, state, and federal resource managers.

The goal is to develop coastal ecosystem understanding through interdisciplinary studies examining the links among terrestrial, nearshore, and marine environments.

Key Science Needs

- Assess the effects of population growth in geologically hazardous or biologically sensitive areas.
- Characterize, measure, and monitor the interactions among geologic, hydrologic, and biologic processes.
- Understand the geologic and hydrologic controls on the habitat of endangered and threatened fish and wildlife.
- Understand watershed linkages with estuarine, coastal and marine environments.
- Evaluate the impacts of increased demand for water on groundwater and surface-water systems, hillslope stability, ecological habitat, and biota.
- Monitor and predict the fate of contaminants and invasive species that may influence the health of ecosystems and, potentially, humans.
- Investigate the role of shoreline armoring in modifying the integrity of shoreline habitats.
- Understand the role of coastal landslides and shoreline erosion on biological habitat.
- Develop Decision Support Technologies to assist natural resource management and policy making.



Massive landslide at Woodway along the bluffs of Puget Sound. This natural event damaged the railroad tracks, and supplied large amounts of sediment to the nearshore environment. The effect of natural events like this one, as well as human-induced changes along the coast on the nearshore ecosystem are unknown.

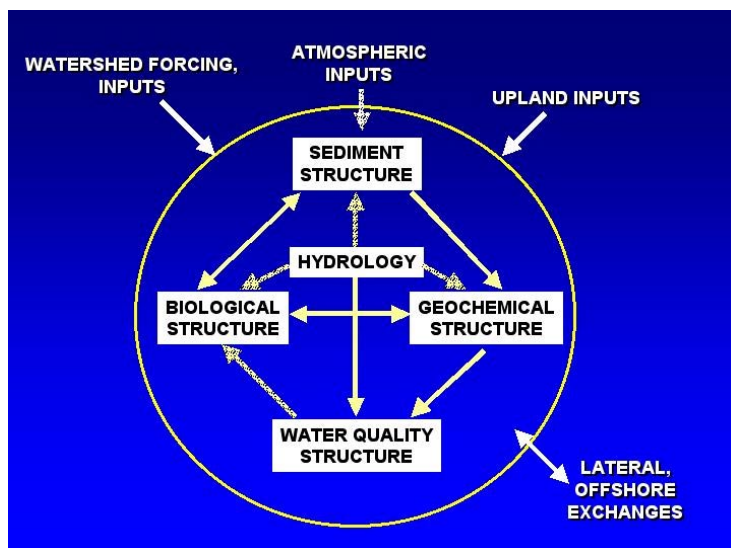
Agencies charged with oversight of coastal resources suffer from lack of specific data and information to support management planning. The USGS science capability in coastal environments can fulfill these needs for a complex array of physical and biological data and information to effectively manage urban growth and development, as well as support specific restoration efforts.

Major Products

Mapping coastal features: provide USGS partners with detailed digital maps of geology, hydrology, and land-use change.

Modeling and predicting bio-geo-hydro interactions: provide USGS partners with tools and models to understand and predict the geological and hydrological factors that control habitat and ecosystem health.

Information management: serve data and information to inform all aspects of ecosystem restoration; reveal trends through monitoring to guide adaptive ecosystem management.



Puget Sound nearshore ecosystem health is controlled by various complex interactions between the geology, hydrology, chemistry, and biology. Some of these interactions are modified by natural events and some by human-induced changes.



For additional information, please contact:

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